



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO THE SECOND 10-YEAR INSERVICE INSPECTION PROGRAM

RELIEF REQUEST RR-ENG-2-2

STP NUCLEAR OPERATING COMPANY

SOUTH TEXAS PROJECT, UNITS 1 AND 2

DOCKET NOS. 50-498 AND 50-499

1.0 INTRODUCTION

By letter dated July 6, 1999, STP Nuclear Operating Company (the licensee) submitted a request for relief from the American Society of Mechanical Engineers (ASME) Code, Section XI, nondestructive examination requirements applicable to South Texas Project (STP), Units 1 and 2, steam generator main steam nozzles (Relief Request No. RR-ENG-2-2). The licensee proposes to forego the ultrasonic examination of the inside-radius section of the steam generator main steam nozzles. The licensee's relief request is applicable to the second 10-year inservice inspection (ISI) interval for STP, Units 1 and 2. A similar request was approved for the licensee's first 10-year ISI interval in a letter from the NRC dated February 22, 1990.

2.0 BACKGROUND

ISI of the ASME Code Class 1, 2, and 3 components shall be performed in accordance with Section XI of the ASME Boiler and Pressure Vessel (B&PV) Code and applicable addenda as required by 10 CFR 50.55a(g), except where specific written relief has been granted by the Commission pursuant to 10 CFR 50.55a(6)(g)(i), or alternatives approved pursuant to 10 CFR 50.55a(a)(3).

Pursuant to 10 CFR 50.55a(g)(4), ASME Code Class 1, 2, and 3 components (including supports) shall meet the requirements, except the design and access provisions and the preservice examination requirements, set forth in the ASME Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," to the extent practical within the limitations of design, geometry, and materials of construction of the components. The regulations require that inservice examination of components and system pressure tests conducted during the first 10-year interval and subsequent intervals comply with the requirements in the latest edition and addenda of Section XI of the ASME Code incorporated by reference in 10 CFR 50.55a(b) 12 months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein. For STP, Units 1 and 2, the applicable edition of Section XI of the ASME Code for the second 10-year ISI interval is the 1989 Edition.

Enclosure

Pursuant to 10 CFR 50.55a(g)(5)(iii), if the licensee determines that conformance with an examination requirement of Section XI of the ASME Code is not practical for its facility, information shall be submitted to the Commission in support of that determination and a request made for relief from the ASME Code requirement. After evaluation of the determination, pursuant to 10 CFR 50.55a(g)(6)(i), the Commission may grant relief and may impose requirements that are determined to be authorized by law and will not endanger life or property or the common defense and security and are otherwise in the public interest, giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility. Although the licensee submitted its request for relief under 10 CFR 50.55a(a)(3)(ii), the NRC staff reviewed and evaluated the licensee's proposed relief request pursuant to 10 CFR 50.55a(g)(6)(i).

3.0 LICENSEE'S REQUEST

The components for which relief is requested:

Steam generator main steam nozzles (inside radius), ASME Code Class 2.

Applicable Code requirement from which relief is requested:

ASME Code, Section, XI Table IWC-2500-1, Examination Category C-B, Item Number C2.22 requires a volumetric (i.e., ultrasonic) examination of the inside radius of the steam generator main steam nozzles.

Licensee's Basis for Requesting Relief (as stated)

Compliance with the specified Section XI examination requirement would result in a hardship without a compensating increase in the level of quality and safety. In accordance with the provisions of 10 CFR 50.55a(a)(3)(ii), the South Texas Project requests relief from the requirements of the referenced Section XI code to perform a volumetric examination of the inside-radius section of the Unit 1 and 2 steam generator main steam nozzles.

In the case of steam generator main steam nozzles of both the original and replacement South Texas Project steam generators, the nozzle is a one-piece forging containing a set of seven holes bored parallel to the nozzle centerline. A flow restrictor is installed in each of these holes. Because the ligaments between the holes distribute the stresses throughout the nozzle forging, there is no high-stress inside-radius section for the South Texas Project steam generator main steam nozzles. Consequently, the Section XI nozzle inside-radius section examination requirements should not be applicable to either the original or the replacement steam generator main steam nozzles.

Licensee's Proposed Alternative Examination (as stated)

No alternative examinations are proposed in lieu of the volumetric examination for which relief is requested.

Licensee's Justification for Granting Relief (as stated)

The inside-radius section of main steam nozzles is considered susceptible to flaw initiation and growth due to the high thermal and mechanical stresses associated with the vessel and connected piping systems. However, the South Texas Project Unit 1 and Unit 2 original and replacement steam generators have a flow restrictor design that utilizes seven parallel holes in the main steam nozzle. This design distributes the stresses throughout the nozzle forging such that there is no high stress inside-radius region in these nozzles. Consequently, the specified Section XI examination should not be applicable to the South Texas Project steam generator main steam nozzles. Because compliance with the specified examination requirement would result in a hardship without a compensating increase in the level of quality and safety, relief from Section XI examination requirement is justified in accordance with 10 CFR 50.55a(a)(3)(ii).

4.0 EVALUATION

The applicable code requirements for the licensee's second 10-year ISI interval would require the licensee to perform an ultrasonic examination on the inside radius of the steam generator main steam nozzles (ASME Code Section XI 1989 Edition Table IWC-2500-1, Examination Category C-B, Item Number C2.22). The code requires that the subject nozzles inner radius sections receive 100 percent volumetric examination.

The licensee's nozzles consist of seven bore holes as the flow path for the high pressure steam as opposed to the nozzle design described in Figure IWC-2500-4. Due to the flow-restrictor-type design, the licensee's steam generator main steam nozzles do not contain a high-stress inside-radius section for which the Section XI volumetric examination is intended. The ligaments between the holes distribute the stresses throughout the nozzle forging, eliminating the high-stress inside-radius section seen in the single hole nozzle design. Consequently, the licensee's steam generator main steam nozzles are not expected to experience cracking in the inside radius region; therefore, the need for a volumetric examination of the inner radius is minimized.

The design of this nozzle is not amenable to volumetric examination. The bore hole orientations preclude a meaningful ultrasonic examination in the area of the inner radius. As a result, the code-required volumetric examination is impractical. Component replacement with a design that is suitable for volumetric examination would be required to obtain complete coverage of the component. Imposition of this requirement would cause a considerable burden on the licensee.

5.0 CONCLUSION

The staff has evaluated the information provided by the licensee in support of its second 10-year ISI interval for relief request RR-ENG-2-2. Based on the information submitted the staff finds the required volumetric exam impractical to perform. The staff concludes that granting of relief will not endanger life or property or the common defense and security and is otherwise in the public interest giving due consideration to the burden upon the licensee that could result if the code requirements were imposed on the facility. Therefore, pursuant to 10 CFR 50.55a(g)(6)(i), the request for relief RR-ENG-2-2 is granted.

Principal Contributor: A. Keim

Date: December 15, 1999